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(54) **DEMODULATION SYSTEM AND METHOD FOR RECOVERING A SIGNAL OF INTEREST FROM A MODULATED CARRIER SAMPLED AT TWO TIMES THE PHASE GENERATED CARRIER FREQUENCY**

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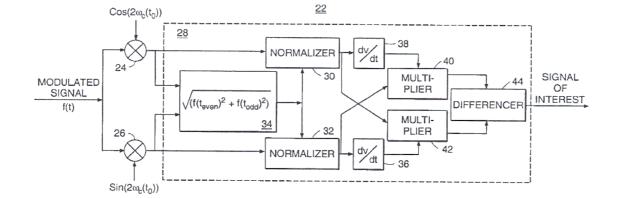
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(57) **ABSTRACT**

A demodulation system and method is used in a sensor system, such as a fiber optic sensor system, that senses optical signals and modulates a phase generated carrier having a carrier frequency ω_c to form a modulated carrier. The modulated carrier is preferably undersampled at two times the carrier frequency $(2\omega_c)$, thereby maximizing the sensors' demodulated bandwidth relative to the sensors' sampling frequency. The undersampled, modulated carrier is orthogonally demodulated by multiplying the modulated carrier by $\cos(2\omega_c(t_0))$ and $\sin(2\omega_c(t_0))$ to extract even and odd harmonic components of the signal of interest. The even and odd harmonic components of the signal of interest are further demodulated by taking the square root of the sum of squares of the even and odd harmonic components, normalizing the even and odd harmonic components, and differentiating, cross-multiplying and differencing the normalized even and odd harmonic components to recover the signal of interest.

17 Claims, 3 Drawing Sheets